PHY 251 FUNDAMENTALS OF PHYSICS II LABORATORY / 1 credit. Experimental techniques for Fundamentals of Physics I. Corequisite: PHY 250.

General Education Objectives (proposed)

1. Students can apply critical thinking to pose and answer questions.
2. Students can use the processes and methods of science and mathematics to demonstrate how reproducible results give rise to the discovery of fundamental laws and the development of theories.
3. Students can articulate a basic knowledge of current scientific understanding of the universe and the scientific and mathematical laws that govern it.
4l Students can summarize, interpret, analyze, and critically evaluate data and reports relating to the natural sciences and mathematics.

A non-exhaustive list of intended learning outcomes follows

(a) Perform simple experiments designed to complement class-room material.
(b) Analyze data collected in a systematic manner and explore the compliance of this data with anticipated theoretical results.
(c) Write a brief technical report covering the particular experiment at hand.
(d) Ability to discuss with colleagues the physical system under study.
(e) Develop an experiential-based method of inquiry leading to a scientifically creative individual.

At the present time, approximately 10 experiments are performed. The particular topics presented in the lab experience are essentially dictated by two factors: the pace of the associated course and the availability of lab equipment. The lab course, owing to the necessity and expense of having multiple setups is necessarily slowly evolving. Particular lab choices were determined firstly by availability of existing equipment (in the Spring of 2001) and secondly by the pace of the course. The present incarnation of the lab experiments is composed of the following experiments:

(1) Electrostatics (covering charging methods and polarization).
(2) Replaced by problem solving in electrostatics.
(3) Series and parallel resistances and capacitances.
(4) Measurement of the EMF from a source and the time dependent RC circuit.
(5) The current balance (magnetostatic field measurements).
(6) Magnetic levitation (action of a ferromagnetic material when exposed to an external field. This lab also provides students with an understanding of magnetic domains, magnetization, and the meaning of magnetization).
(7) Transformers.
(8) Oscilloscopes (In the context of the application of an RC low-pass and high-pass filter, students are introduced to use of oscilloscopes and signal generators. The intention of this particular lab is to provide students with background into a very fundamental piece of research equipment found in almost any lab. Application of this to filter circuits provides students additional details regarding limiting frequency behavior of circuit elements).
(9) Determination of index of refraction and the angle of refraction of materials.
(10) Focal length of converging and diverging lenses and Brewster’s angle.

Of these labs, presently 7 of the labs are interfaced (2,3,4,5,6,7,8) above.